HGMSZ
Halogen Gas Monitor Single Zone

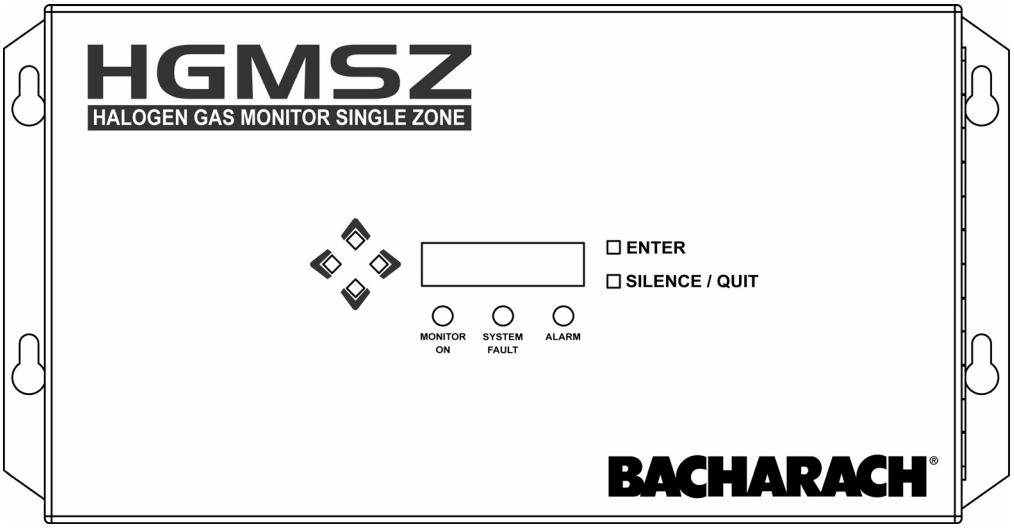
Instruction 3015-4256
Installation / Operation / Maintenance

Rev. 3 – June 2006

US C entela Certified

CE

Complies with
UL 61010A-1 and
CSA 22.2 No. 1010.1



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Product Name:	HGMSZ (Halogen Gas Monitor Single Zone) conforms to the following harmonized European EMC standards: EN61326-1 EN61000 EN55022

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Introduction

How to Use This Manual

Thank you for investing in a Bacharach HGMSZ (Halogen Gas Monitor Single Zone) monitoring unit.

To assure operator safety and the proper use of the HGMSZ monitor, please read, understand, and follow the contents of this manual, which provides important information on the installation, operation, and maintenance of the monitor.

If you have a working knowledge of refrigerant monitors, you will find this manual useful as a reference tool. If you are new to the use of refrigerant monitors, you can educate yourself about the principles of refrigerant gas detection and the proper operation of this device by reading this manual thoroughly.

Warning Statements

The use of the word **WARNING** in this manual denotes a potential hazard associated with the use of this equipment. It calls attention to a procedure, practice, or condition, or the like, which if not correctly performed or adhered to, could result in personal injury or death.

Caution Statements

The use of the word **CAUTION** in this manual denotes a potential hazard associated with the use of this equipment. It calls attention to a procedure, practice, condition, or the like, which if not correctly performed or adhered to, could result in damage to the equipment.

Hazard Symbols on Monitor

This symbol indicates the need to consult this operating instruction manual when opening the enclosure.

WARNING: A potential risk exists if the operating instructions are not followed.

This symbol indicates the presence of electric shock hazards when the enclosure is opened.

WARNING: To avoid risk of injury from electric shock, do not open the enclosure without first disconnecting AC power.

Safety Precautions

AC Power Supply

The HGMSZ uses a universal power supply that is capable of accepting inputs of 100 to 240 VAC, 50/60 Hz. The monitor's power consumption is 15 Watts. It is highly suggested that the monitor be connected directly to the AC power source, preferably on its own circuit (with UPS or surge protection).

A switch or circuit breaker rated 1.0 A, 250 VAC, with a minimum terminal spacing of 3.0 mm must be attached to the monitor's AC power leads. This switch must also be located in close proximity to the monitor, and be in easy reach of the operator. This switch should also be clearly marked as the monitor's main AC disconnect device.

Protective Grounding

Under no circumstances should the HGMSZ be operated without connection to a protective ground. Doing so poses a potential shock hazard and is also a violation of electrical safety standards applicable to this type of equipment.

Explosive Atmosphere

Do not operate this equipment in the presence of flammable liquids, vapors or aerosols. Operation of any electrical equipment in such an environment constitutes a safety hazard.

Proper Exhaust Venting

It is imperative that the monitor's exhaust port be vented as described in this manual. Failure to do so may constitute a safety hazard.

Working Inside Monitor

Extreme care should be exercised when accessing the interior of the monitor. Only qualified electrical maintenance personnel should perform connections and adjustments. Always remove AC power before working inside the monitor.

Misuse and Modifications to Monitor

The protection provided by the monitor may be impaired if the monitor is used in a manner not specified by Bacharach, Inc. Changes or modifications to this monitor, not expressly approved, will void the warranty.

In Case of Malfunction

Do not continue to use this equipment if there are any symptoms of malfunction or failure. In the case of such occurrence, de-energize the power supply and contact a qualified repair technician or the nearest Bacharach Service Center. Use ONLY the provided knockouts for electrical and communication wiring. Drilling into the box will void the warranty.

Fusing

F1, F2: 1.0 A, 250 V, Type "F"

Installation Category

Installation Category II, Pollution Degree II, as defined by UL.

Altitude Limit

6,562 ft (2,000 m)

Cleaning

To clean the outside of the case, **DO NOT** use soap and water. **USE** a dry cloth.

Functional Overview

General Description

Refrigerant monitors are specified to support compliance to federal, state and local safety codes governing refrigerant emissions. Avoiding significant refrigerant loss reduces equipment replacement costs, maintains equipment efficiency, promotes safety, and protects the environment.

The Bacharach HGMSZ (Halogen Gas Monitor Single Zone) monitoring unit is easily programmed to continuously monitor the level of any one of several types of refrigerant gases in an area that is located up to 50 ft (15.2 m) away from the monitor. The HGMSZ displays the type of gas being monitored, along with displaying both the current gas level and the peak gas level detected in that area on its front panel LCD. The monitor retains a log of previous readings that can be easily accessed for analysis.

An audible alarm and front panel indicators are provided to signal alarm and fault conditions, and relay contacts are provided that can be used to trigger external alarm devices in the event of a system fault, or if a leak (small), spill (medium), or evacuation (large) level of gas is detected. The system also includes a 4–20 mA current loop interface that can be connected to remote monitoring equipment.

The HGMSZ requires only minor periodic maintenance such as the occasional replacement of filters. The monitor incorporates active diagnostics that continuously check the system for proper operation. A front panel indicator is provided to alert an operator of system malfunctions, and fault codes are generated that enable the operator to identify the cause of the fault.

Understanding Monitoring Levels

Effective use of this monitor requires an understanding of what constitutes reasonable alarm set points for the type of gas being monitored. All AC&R systems leak some refrigerant. In a good “tight” installation these background levels will be acceptably low and often do not require corrective action. You can reduce nuisance alarms and needless service calls if the alarm levels are set at practical limits.

Refrigerant manufacturers define allowable exposure levels and threshold limit values in units of parts per million (ppm). Bacharach has developed recommended monitoring levels based on compliance to ANSI/BSR ASHRAE 15-1994 and ASHRAE Safety Code 34-1992. These reference levels are listed in the Appendix (Page 29).

Setting the monitor at these recommended alarm levels will satisfy the needs of most users. However, the ppm levels generated by system leaks into the environment are greatly influenced by the volume of air in the sampling area, air circulation, size of the leak, distance to the monitoring point, and a host of other variables. In some cases the set points may need to be adjusted either up or down to achieve effective monitoring.

Response to the Presence of Multiple Refrigerants

The HGMSZ is a refrigerant level monitor, not a gas analyzer. You must program the monitor to test for a specific refrigerant, and it will only return accurate concentration readings for that particular refrigerant. If a leak occurs of another refrigerant gas type, the monitor may return incorrect readings.

Most applications only require detection of a single refrigerant and the problems that are associated with monitoring multiple gases are rarely an issue. If there is a possibility of multiple refrigerants leaking in the same sampling zone, then you should carefully consider which refrigerant compound you program the unit to monitor.

Suggested Location of Sampling Point

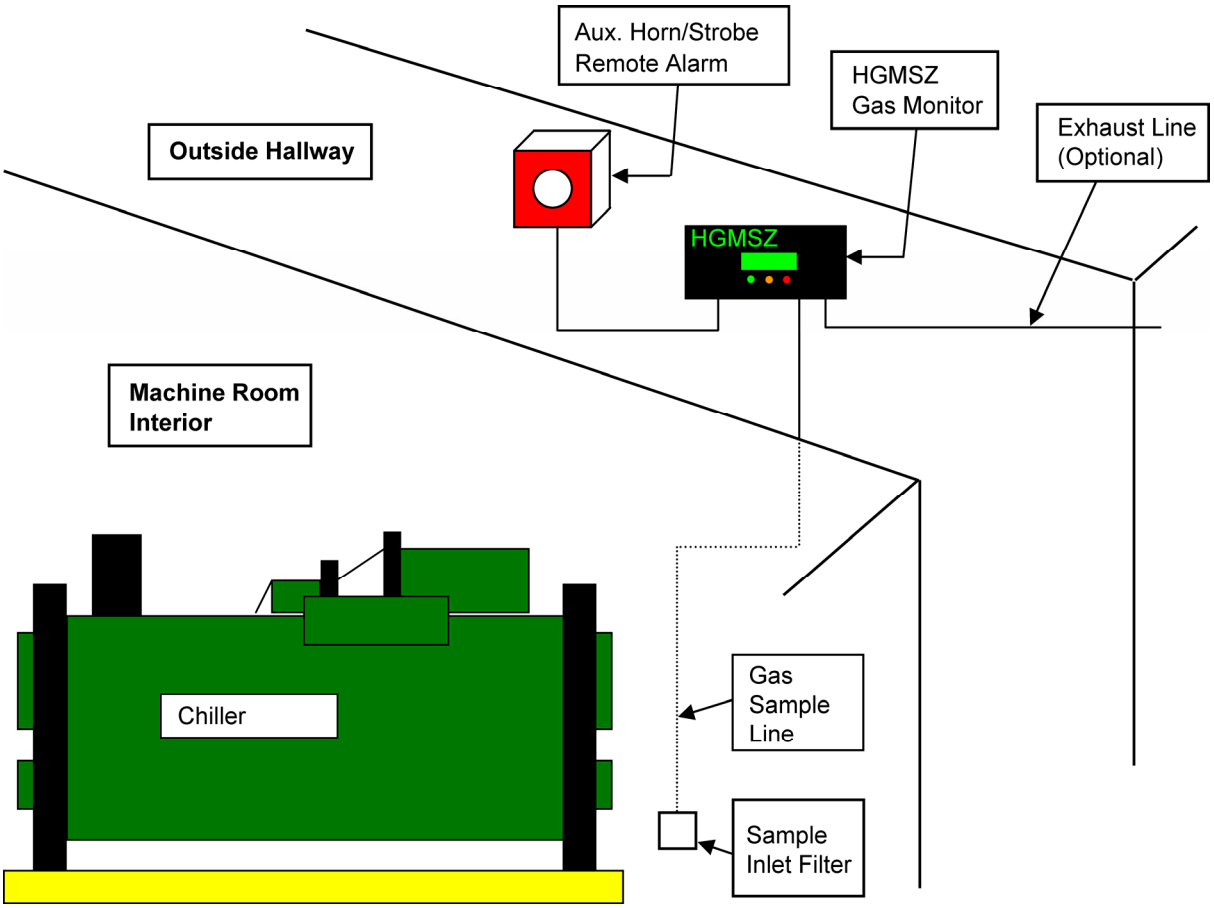
At the point of a refrigerant leak the gas is nearly pure. As the refrigerant is dispersed into the air, the gas molecules diffuse causing a dilution of the original concentration. The HGMSZ measures the refrigerant concentration at the point the sample is collected. Therefore, if the termination of the collection line is not at the exact point of the refrigerant leak, then the monitor will read a diluted mixture of the refrigerant gas and air.

It should also be noted that halogen refrigerant gas is heavier than air and tends to collect below the point of a leak. Therefore a sample taken near the floor will have a greater concentration of gas than that collected above the source of a leak. Consequently, the sampling point should ideally be located as close as possible to the source of a potential leak. If this is impractical, then the alarm set points should be adjusted to compensate for the dilution of the refrigerant gas.

The HGMSZ should be mounted outside of the mechanical room or at least just inside of a door to the room. The monitor should be readily accessible for easy visual monitoring and servicing. The gas-sample line can be up to 50 ft (15.2 m) in length. If the area around the monitor is not well ventilated, then an optional exhaust line can be run to an outside location. The length of the exhaust line cannot exceed 50 ft (15.2 m).

It may be necessary to perform a “smoke” test of the mechanical room to determine the best monitoring point. The smoke test would provide the pattern of air currents present in the room.

HGMSZ Refrigerant Gas Leak Monitor Mechanical Room Placement



Installation

Installation Considerations

Warnings and Cautions

WARNING: *Explosion hazard! Do not mount the HGMSZ in an area that may contain flammable liquids, vapors or aerosols. Operation of any electrical equipment in such an environment constitutes a safety hazard.*

WARNING: *Shock hazard! Always disconnect AC power before working inside the monitor.*

CAUTION: *Drilling holes in the HGMSZ enclosure may damage the unit and will void the warranty. Please use knockouts provided for electrical connections.*

CAUTION: *The HGMSZ contains sensitive electronic components that can be easily damaged. Be careful not to touch or disturb any of these components.*

Inspection

The HGMSZ has been thoroughly inspected and tested prior to shipment from the factory. Nevertheless, it is recommended that the monitor be re-checked prior to installation. Inspect the outside of the enclosure to make sure there are no obvious signs of shipping damage. Open the enclosure and inspect the interior of the monitor for loose components that may have become dislodged during shipment. If damage is discovered, please contact the nearest Bacharach Service Center for assistance.

Locating the Monitor

Locate the HGMSZ so that no more than 50 ft (15.2 m) of tubing will be needed to reach the sampling area, and that no more than 50 ft (15.2 m) of tubing will be required for the exhaust. Since the monitor uses ambient air to zero its gas sensor, the monitor should be located in an area that normally does not contain refrigerant gas. If an exhaust line is not used, then locate the monitor in a well ventilated area so that the exhaust gas does not accumulate around the monitor's ventilation holes.

The HGMSZ should be operated in an environment that is between 32 and 122°F (0 and 50°C), has a relative humidity of between 5 and 90% non-condensing, and is at an altitude of no more than 6,562 ft (2,000 m). The area should also be relatively free of dirt, grease, and oils that could adversely affect the operation of the monitor.

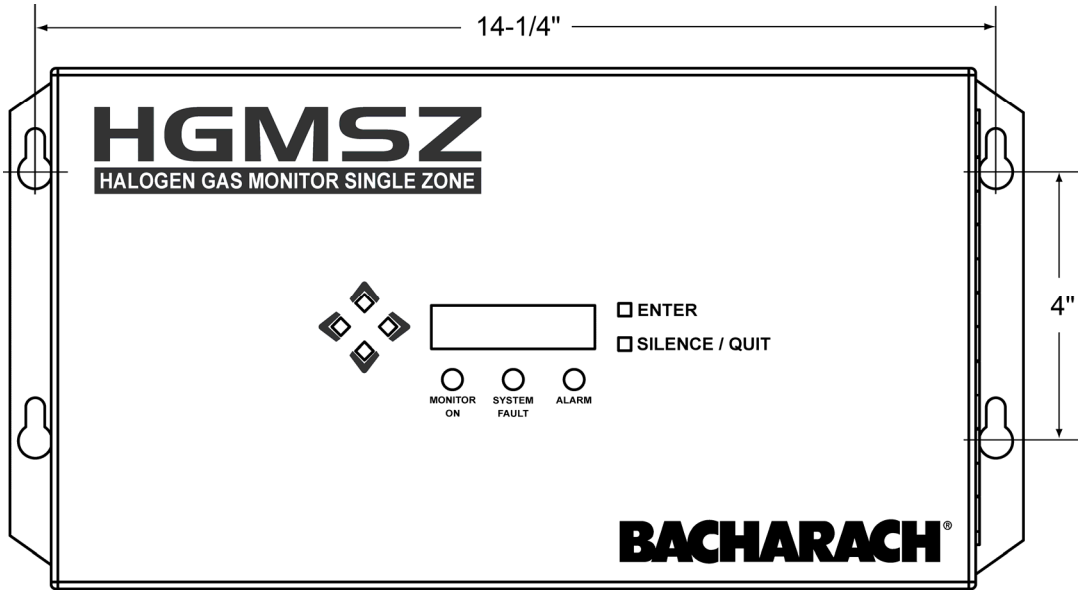
The location should allow the monitor to be easily accessible for visual monitoring and servicing.

Mounting Instructions

The HGMSZ should be installed plumb and level and securely fastened to a rigid mounting surface.

The enclosure utilizes keyhole mounting brackets designed for #12 pan head screws. Locate the four screws as shown in the diagram below and leave the screw heads protruding approximately 3/16".

Enclosure Mounting Specs



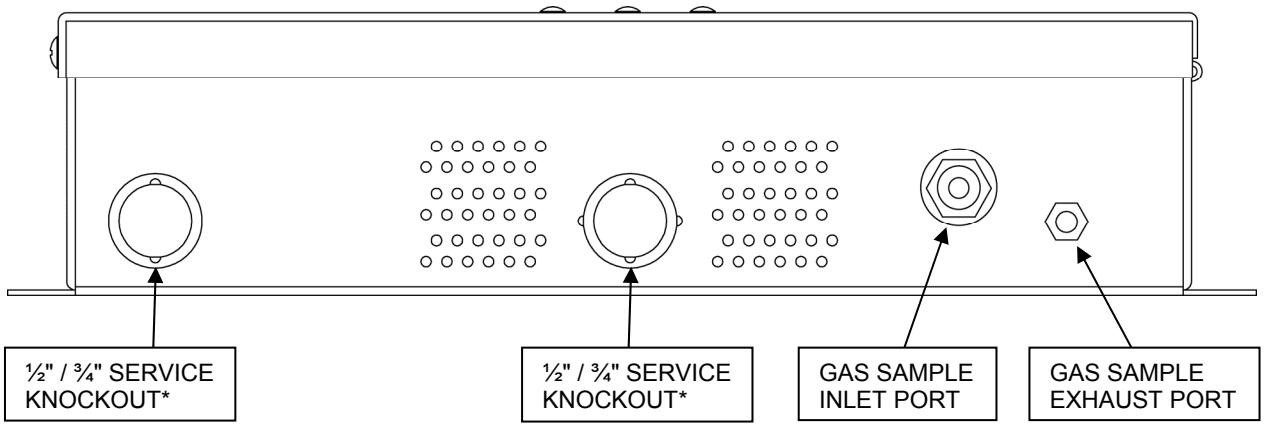
Hold the monitor flat against the mounting surface and allow it to slide down engaging the screw heads in the keyhole slots of the mounting brackets. Adjust the screws as necessary to hold the monitor securely against the mounting surface.

Connecting Gas Sample and Exhaust Lines

Overview

A single gas-sample line needs to be run from the HGMSZ to the area of the facility to be monitored. An optional exhaust line can also be installed to vent refrigerant gas away from the monitor. All tubing connections are made on the bottom of the enclosure as shown in the illustration below.

HGMSZ Bottom View



* There is an additional Service Knockout on top of the case

Tubing Considerations

Use ¼" outside diameter (0.040" wall) flex tubing for all air lines (P/N 304-2743 or equivalent). The tubing should be clean and free of moisture or other contaminants. The tubing should be cut cleanly with a sharp knife and care should be taken not to distort the tubing end.

Connecting the Gas-Sample Line

To connect the gas-sample line to the monitor, simply push the tubing into the Gas Sample Port. All tubing bends should have a radius of no less than 5" to insure proper airflow. If kinks or obstructions occur in the line the monitor may not function properly.

Please refer to Section *Suggested Location of Sampling Point* (Page 4) to learn more about where to take a sample.

The gas-sample line can be up to **50 ft (15.2 m)** in length. The end of this line should be placed near the potential leak source and positioned to reduce the possibility of mists, aerosols, oil, water, dust, or other contaminates being drawn into the monitor. For added protection, a termination filter (P/N 3015-3420) should be attached to the end of this line.

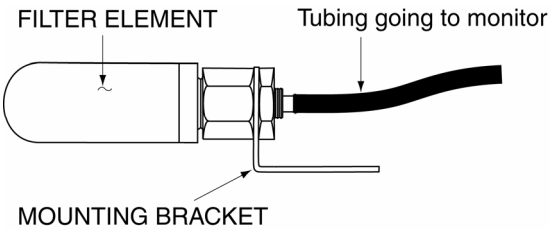
CAUTION: *The introduction of contaminants through the gas-sample line can result in serious and permanent damage to the monitor.*

Connecting the Exhaust Line

The exhaust line functions to carry the exhausted gas sample away from the monitor, and is required if the monitor is located in a confined, poorly ventilated area. Note that if the monitor is exposed to an usually high level of refrigerant gas for prolonged periods of time, its charcoal filter will quickly become saturated and no longer to able to clean the purge-air of refrigerant gas.

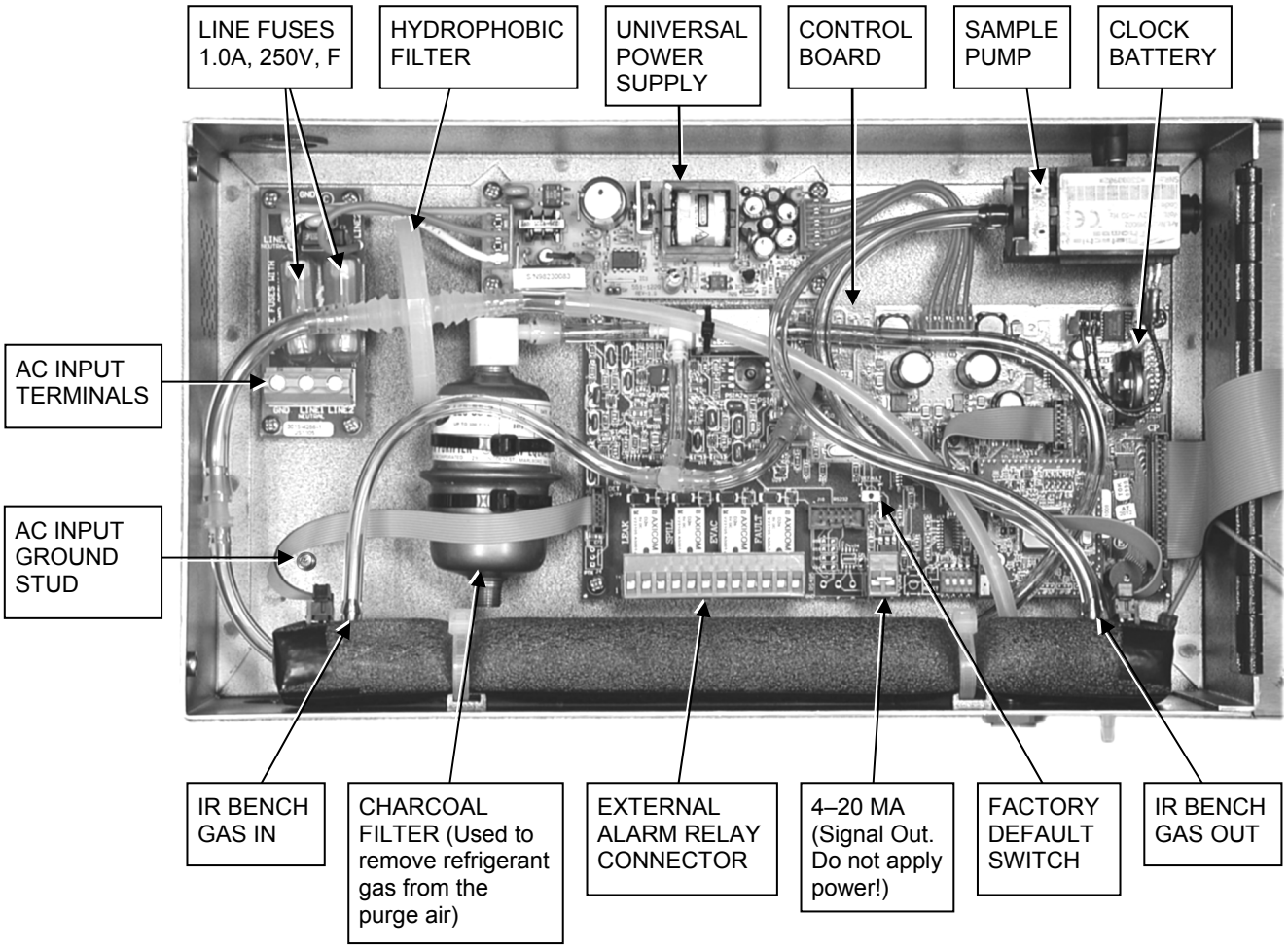
The exhaust line can be up to **50 ft (15.2 m)** in length. Ideally this line should terminate outdoors in a location that is not exposed to the elements. Connect the exhaust line to the monitor by firmly pushing the tubing onto the Exhaust Port's barbed fitting. If the exhaust line terminates outside the building, position the tubing so that no water or moisture can enter the line. Note that this line does not require a termination filter.

Termination Filter (P/N 3015-3420)



Interior Schematic

Interior Schematic


LINE FUSES 1.0A, 250V, F
HYDROPHOBIC FILTER
UNIVERSAL POWER SUPPLY
CONTROL BOARD
SAMPLE PUMP
CLOCK BATTERY
AC INPUT TERMINALS
AC INPUT GROUND STUD
IR BENCH GAS IN
CHARCOAL FILTER (Used to remove refrigerant gas from the purge air)
EXTERNAL ALARM RELAY CONNECTOR
4–20 MA (Signal Out. Do not apply power!)
FACTORY DEFAULT SWITCH
IR BENCH GAS OUT

Electrical Wiring

The HGMSZ uses a universal power supply that is capable of accepting inputs of 100 to 240 VAC, 50/60 Hz. The monitor's power consumption is 15 Watts. It is highly recommended that the monitor be connected directly to the AC power source, preferably on its own circuit. The AC power connection should be completed with UL approved 3-conductor wire (14–18 AWG), rated 300 VAC at 105°C.

Locate a convenient service knockout and install electrical conduit in the typical manner.

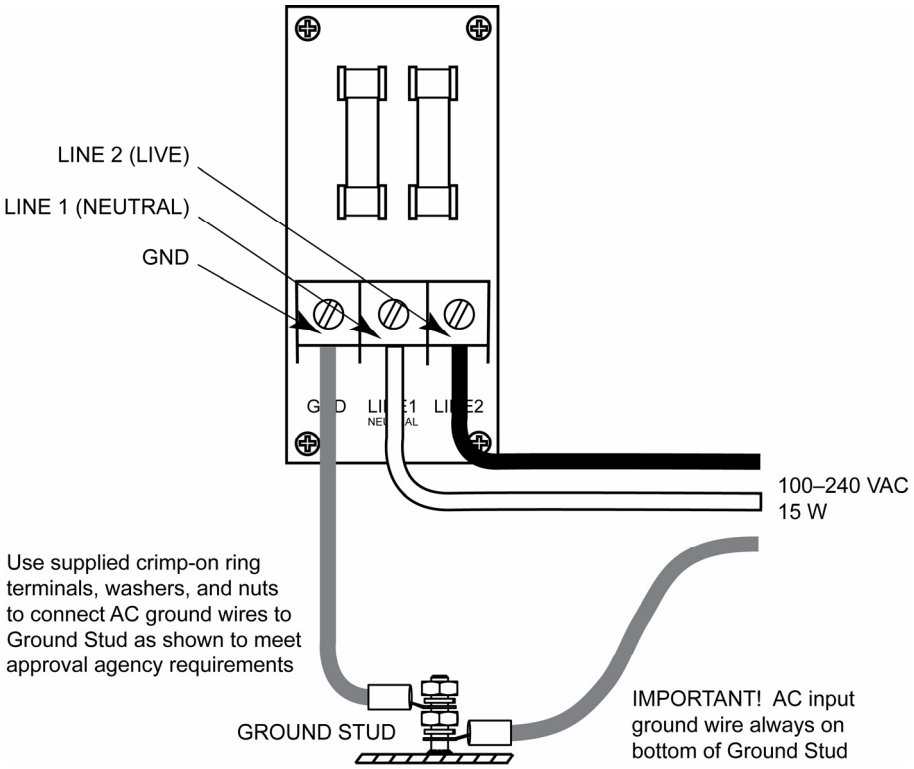
Locate the AC Input Terminals and Ground Stud on the inside of the monitor (Page 8).

Secure the incoming AC power neutral (white) and live (black) wires to the LINE 1 and LINE 2 terminals.

Using the supplied crimp-on ring terminals, washers, and nuts, connect the incoming AC power ground wire (green) to the monitor's AC Input Ground Stud, and then install a separate wire between the ground stud and the GND terminal.

A switch or circuit breaker rated 1.0 A, 250 VAC, with a minimum terminal spacing of 3.0 mm must be attached to the monitor's AC power leads. This switch must also be located in close proximity to the monitor, and be in easy reach of the operator. This switch should also be clearly marked as the monitor's main AC disconnect device.

AC Power Connections


LINE 2 (LIVE)
LINE 1 (NEUTRAL)
GND
100–240 VAC
15 W
Use supplied crimp-on ring terminals, washers, and nuts to connect AC ground wires to Ground Stud as shown to meet approval agency requirements
GROUND STUD
IMPORTANT! AC input ground wire always on bottom of Ground Stud

WARNING: *Electrical installation should be performed by a certified electrician, and should comply with all applicable NEC/CEC and local electrical safety codes.*

WARNING: *The AC power ground wire must first be connected to the monitor's ground stud. Under no circumstances should this monitor be operated without a protective ground. Doing so poses a potential shock hazard, and is also a violation of electrical safety standards applicable to this type of equipment.*

CAUTION: *Drilling holes in the HGMSZ enclosure may damage the unit and will void the warranty. Please use knockouts provided for electrical connections.*

Connecting External Alarms

Overview

The HGMSZ includes four SPDT relays whose contacts are rated 3 A at 240 VAC. These relays are used for the connection of external alarm devices that are activated when the relay is energized. The relays are factory assigned to energize under the following conditions:

Relay #1	Leak	Alarm Point 100 ppm
Relay #2	Spill	Alarm Point 300 ppm
Relay #3	Evacuate	Alarm Point 500 ppm
Relay #4	Fault	System Fault Event

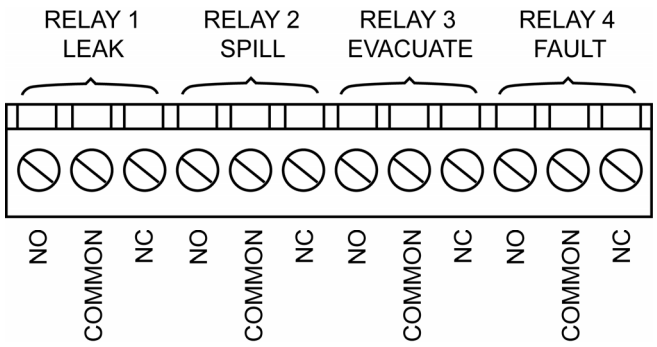
Note that the alarm points of relays #1, #2, and #3 are set using the monitor's **LEAKLVL**, **SPILLLVL**, and **EVACLVL** function screens (Page 16).

Connection

Use any of the service knockouts to gain cable access to the interior of the monitor. Locate the External Alarm Relay Connector (Page 8). Secure the leads from the external alarm device and its power source to the connector as shown in the diagram below.

The diagram on Page 11 shows a typical connection to Relay 1. Note how power to the alarm device is being tapped off the monitor's AC Input Terminals.

External Alarm Relay Connector

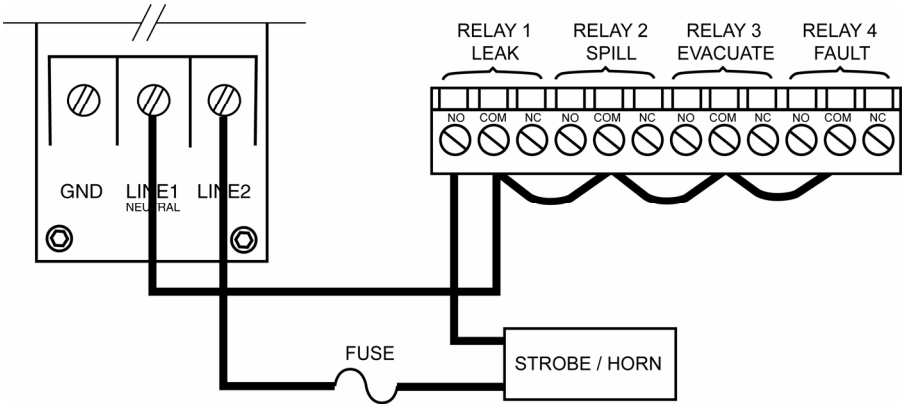


Each relay may be connected as normally open (NO), or normally closed (NC).

The relay contacts are rated 3 A at 250 VAC.

Power for the external alarm devices may be supplied from an external power source, or from the monitor's AC input terminals.

Typical External Alarm Relay 1 Wiring



Jumper the 'Neutral' line of an external power source or the monitor's AC input to the 'Common' terminals on the relay connector.

Connect one end of the strobe or horn to the 'NO' terminal of whichever level of alarm is appropriate for the application.

The other end of the strobe or horn is connected to the other leg of the external power source. For protection, install an in-line fuse of the appropriate size and design for the external alarm device being used.

4–20 mA Current Loop Interface

An external 4–20 mA monitoring device (e.g., chart recorder) can be connected to the HGMSZ using a shielded-twisted-pair cable. Use any of the service knockouts to gain access to the interior of the monitor. Locate the 4–20 mA connector (Page 8); remove it from the circuit board; and then remove the resistor or shorting wire from its terminals.

IMPORTANT! *The monitoring device must be isolated from ground (floating).*

NOTE: *A 100 ohm, ¼ W resistor must be connected to the 4–20 mA connector if no external monitoring device is used. Failure to install this resistor will cause loop-fault code <0010> to occur (Page 19).*

Secure the wire leads from the external monitoring device to the 4–20 mA connector as shown in the diagram below, making sure that the polarity at this connector matches the wiring at the monitoring device. When you are through securing the connections, carefully plug the connector back onto the circuit board.

The default current-to-ppm factor is set to 0.016 mA = 1 ppm, providing a measurement range of 0 ppm (4 mA) to 1,000 ppm (20 mA). Note that the current-to-ppm factor can be changed using the monitor's **LOOP** function (Page 16).

To facilitate loop zero and span checking, note that when the **LOOP** function is selected the loop output is set to 20 mA, and upon exiting this function the loop output is set to 4 mA.

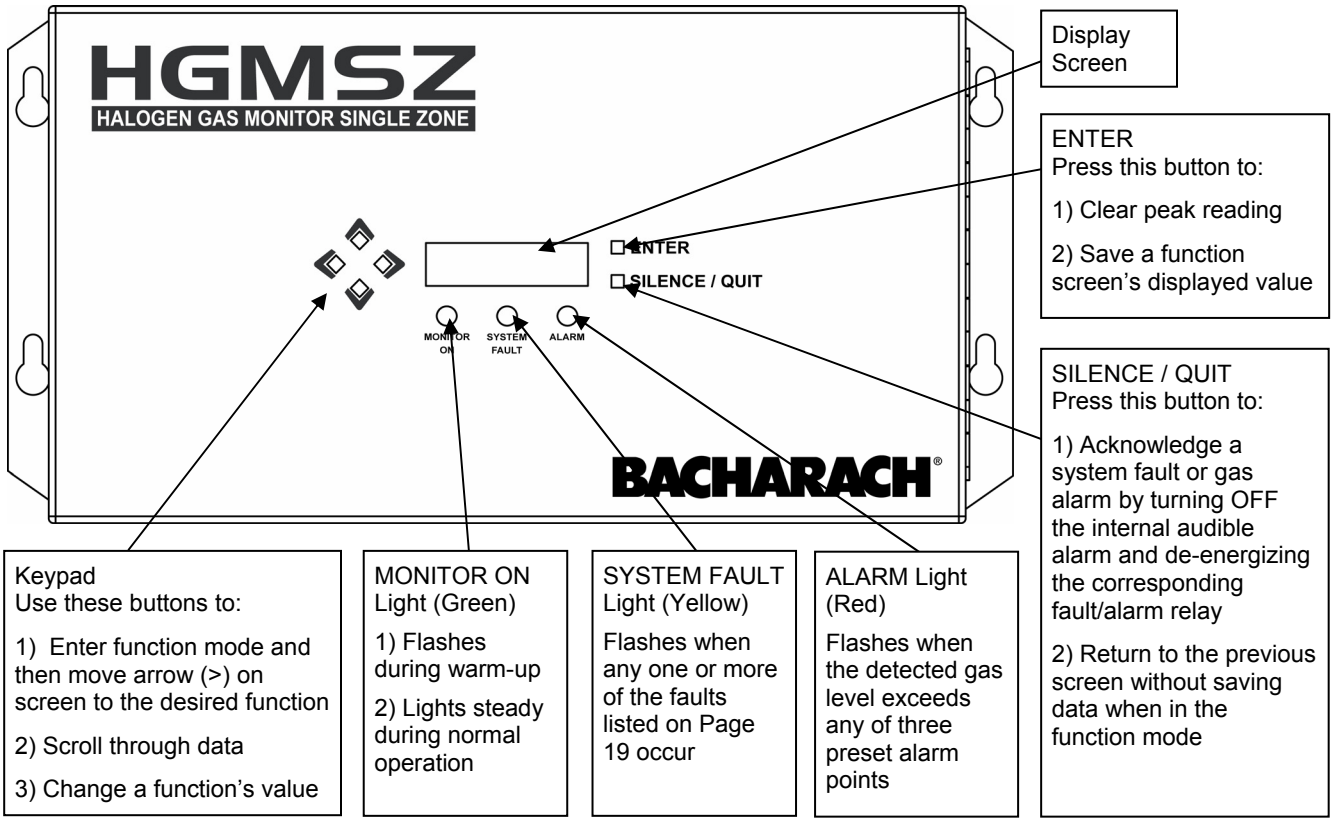
4–20 mA Current Loop Connector

CAUTION: *Never apply power to the 4–20 mA Current Loop Connector from an external power supply. Connect only a load resistor and/or a floating measurement device.*

Notes:

Operation

Front Panel Display and Controls


HGMSZ
HALOGEN GAS MONITOR SINGLE ZONE
ENTER
SILENCE / QUIT
MONITOR ON
SYSTEM FAULT
ALARM
BACHARACH
Display Screen
ENTER
Press this button to:
1) Clear peak reading
2) Save a function screen's displayed value
SILENCE / QUIT
Press this button to:
1) Acknowledge a system fault or gas alarm by turning OFF the internal audible alarm and de-energizing the corresponding fault/alarm relay
2) Return to the previous screen without saving data when in the function mode
Keypad
Use these buttons to:
1) Enter function mode and then move arrow (>) on screen to the desired function
2) Scroll through data
3) Change a function's value
MONITOR ON Light (Green)
1) Flashes during warm-up
2) Lights steady during normal operation
SYSTEM FAULT Light (Yellow)
Flashes when any one or more of the faults listed on Page 19 occur
ALARM Light (Red)
Flashes when the detected gas level exceeds any of three preset alarm points

General Operation

Once the HGMSZ has been installed, set up, and powered ON, the monitor will make measurements in the area being sampled for refrigerant gas without further operator intervention. The results of those measurements are shown on the front panel display.

```
MEASURE  00485pk
   45ppm R134A
```

In the example shown above, **MEASURE** indicates that the HGMSZ is actively monitoring for refrigerant gas, and that currently 45 ppm of R-134a gas is being detected. This display also indicates that a peak measurement of 485 ppm has been made.

An operator can reset the peak value to zero by pressing the **ENTER** button.

A log of up to 200 previous measurements can be viewed using the **PPM LOG** function (Page 15).

If the detected gas level exceeds the preset Leak, Spill, or Evacuate alarm point, then the monitor responds by turning ON the front panel **ALARM** (red) light and energizing the corresponding alarm relay. If the internal audible alarm is turned ON, it too will activate (**AUDALRM** page 17). Optional external alarm devices can be connected to the alarm relays to alert personnel that a Leak, Spill, or Evacuate alarm condition has occurred (Page 10). Pressing the front panel **SILENCE** button will acknowledge an alarm and turn OFF all alarm indicators with the exception of the front panel **ALARM** light. The alarm circuit will reactivate, however, if the alarm condition is not cleared within the time period set by the **SILENCE** function (Page 17). The ALARM light will turn OFF after the detected gas level goes below the lowest alarm point and after the **SILENCE** button is pressed.

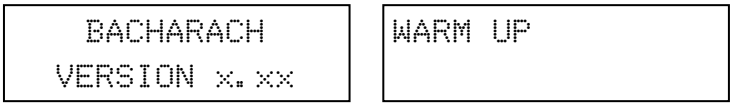
If a system fault occurs (see Fault Code list on Page 19), the monitor responds by turning ON the front panel **SYSTEM FAULT** (yellow) light and energizing the fault relay. If the internal audible alarm is turned ON, it too will activate (**AUDALRM** page 17). An optional external alarm device can be connected to the fault relay to alert personnel that a system fault has occurred (Page 10). Pressing the front panel **SILENCE** button will acknowledge the fault and turn OFF all alarm indicators with the exception of the front panel **SYSTEM FAULT** light. The alarm circuit will reactivate, however, if the fault condition is not cleared within the time period set by the **SILENCE** function (Page 17). The **SYSTEM FAULT** light will turn OFF only after the cause of the fault has been eliminated.

A log of the alarm and fault events can be viewed using the monitor's **ALARMS** and **FAULTS** function (Page 15).

Display Screens

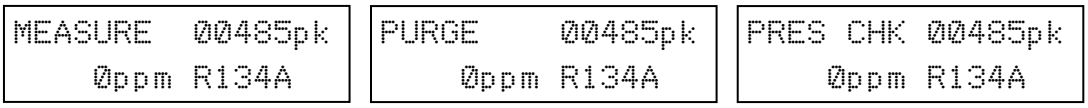
Initial Power Up

When the HGMSZ is first powered up all front panel lights are turned ON, and a splash screen appears showing the monitor's firmware version level. After a brief moment the **Warm Up** screen is display along with the front panel **MONITOR ON** light (green) blinking.



The monitor takes 15 minutes to warm up; after which, the **MONITOR ON** light glows steady and the **Data Display** screen is displayed.

Data Display Screen



During normal operation, the **Data Display** screen shows when the monitor is performing the following three functions:

MEASURE indicates that the monitor is actively monitoring for refrigerant gas. In the example screens shown above, the monitor is currently detecting 0 ppm of R-134a gas, and that a peak measurement of 485 ppm has occurred.

To reset the peak value to zero, press the **ENTER** button.

PURGE is displayed when the monitor is resetting its infrared detector to a baseline of 0 ppm using ambient air as the gas sample. This purging process is performed on an "as needed" basis, which is normally once every 6 to 8 minutes.

Note that a Charcoal Filter (Page 8) is present in the purge-air stream to filter out any refrigerant gas that would otherwise cause the baseline level to be something other than 0 ppm.

PRES CHK is displayed when the monitor is performing an atmospheric pressure check, which is done to ensure the accuracy of the gas measurement under varying atmospheric conditions. This pressure check is performed every 30 minutes.

Function Screens

The Function screens are used to display stored data and to set up the monitor.

From the **Data Display** screen, press any **Keypad** button to display the first **Function Menu** screen. Next, use the **Keypad** buttons to move the arrow (>) on the display until it is next to the desired function, and then press the **ENTER** button to select that function.

```
>PPM LOG FAULTS
 ALARMS  DIAGNOS
```

```
>LOG INT AUDALRM
 LOOP    CLOCK
```

```
>P-CHK   CUST K2
 CUST K1 CUST K3
```

```
>GASTYPE SPILLVL
 LEAKLVL EVACLVL
```

```
>SILENCE ZONETMP
 SQUELCH CAL
```

Once a function has been selected, use the **Keypad** to scroll through the displayed data or to change a parameter associated with that function. Press **ENTER** to save newly entered parameters. Press the **QUIT** button to return to the previous screen without saving.

Note that if no buttons are pressed within 90 seconds after selecting a function, the monitor returns to the **Data Display** screen.

PPM LOG – Contains records of the last 200 measurements. Each record shows the measurement's date, time, and ppm level. Note that the interval at which the measurements are logged is determined by the **LOG INT** function.

```
#025     425PPM @
11/07/03  15:35
```

Use the **Keypad Up** and **Down** buttons to change the record number by a factor of 1. Use the **Right** and **Left** buttons to change the record number by a factor of 10. Press **QUIT** to return to the previous screen.

In the example on the right, record #025 shows that a level of 425 ppm was measured on 11/07/03 at 15:35.

Note that the PPM Log can be cleared as described in Section *Clearing the Stored PPM Log, Alarms & Faults Data* (Page 20).

ALARMS – Contains records of the last 30 alarm events, with the monitor's most recent alarm being shown when the **Alarm** screen is first displayed. After 30 events have been recorded, the newest record overwrites the oldest. Each record displays either LEAK, SPILL, or EVAC including the date and time the alarm occurred. Use any of the **Keypad** buttons to scroll through the other alarm records. Press **QUIT** to return to the previous screen. Refer to *Working with Gas Alarms* (Page 18).

```
#03      SPILL @
11/10/03  15:06
```

Note that the ppm levels at which alarms occur are set using the **LEAKLVL, SPILLLVL**, and **EVACLVL** functions.

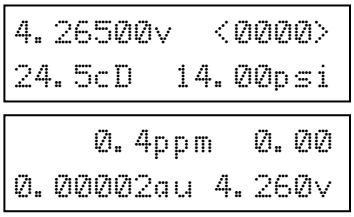
In the example on the right, record #03 shows that a spill event occurred on 11/10/03 at 15:06.

FAULTS – Contains records of the last 30 fault events, with the monitor's current fault status being shown when the **Fault** screen is first displayed. After 30 events have been recorded, the newest record overwrites the oldest. Each record lists an event's numeric fault code plus the date and time the fault occurred. Use any of the **Keypad** buttons to scroll through the other fault records. Press **QUIT** to return to the previous screen. Refer to *Working with System Faults* (Page 18).

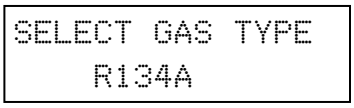
```
#15 <1000> @
11/10/03  12:37
```

In the example on the right, record #15 shows that a Purge Flow Fault <1000> occurred on 11/10/03 at 12:37.

DIAGNOS – Enters the diagnostic function. Press the **Up Arrow Keypad** button to toggle between the monitor's two diagnostic screens. Refer to *Working with the DIAGNOS Function* (Page 21).

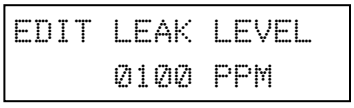


GASTYPE – Used to select of any one of 30 gas types plus one custom gas for monitoring. Factory default is R-134a. Note that the factory can program a custom gas type as specified on the sales order, or a custom gas can programmed into the monitor at a later time using the **CUST K1, K2, K3** function. Use the **Keypad** to select the desired gas type, and then press **ENTER** to save the selection and return to the previous screen.



Gases Available for Selection: R-11, R-12, R21, R-22, R-23, R-113, R-114, R-123, R-124, R-134a, R-227, R-236FA, R-401a, R-402a, R-402b, R-404a, R-407a, R-407c, R-408a, R-409a, R-410a, R-500, R-502, R-503, R-507, R-508b, H-1211, H-1301, H-2402, N-1230, CUSTOM

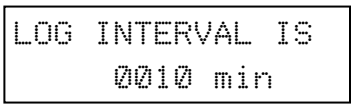
LEAKLVL – Sets the Leak Alarm level, adjustable from 1 to 300 ppm. Factory default is 100 ppm. Note that the Leak Alarm level cannot be set higher than either the Spill or Evacuate Alarm levels. Refer to Appendix for recommended alarm settings for other gases. Use the **Keypad** to set the desired Leak Alarm level, and then press **ENTER** to save that level and return to the previous screen.



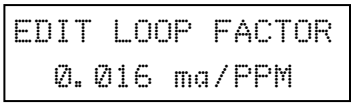
SPILLLVL – Sets the Spill Alarm level, adjustable from no lower than the Leak Alarm level to a maximum value of 500 ppm, but not higher than the Evacuate Alarm level. Factory default is 300 ppm. Refer to Appendix for recommended alarm settings for other gases. Use the **Keypad** to set the desired Spill Alarm level, and then press **ENTER** to save that level and return to the previous screen.

EVACLVL – Sets the Evacuate Alarm level, adjustable from no lower than the Spill Alarm level to 9999 ppm. Factory default is 500 ppm. Refer to Appendix for recommended alarm settings for other gases. Use the **Keypad** to set the desired spill level alarm level, and then press **ENTER** to save that level and return to the previous screen.

LOG INT – Sets the interval at which measurements are logged to memory from 1 to 9999 minutes. Factory default is 10 minutes. Note that the logged measurements can be viewed using the **PPM LOG** function. Use the **Keypad** to enter the desired value, and then press **ENTER** to save that value and return to the previous screen.

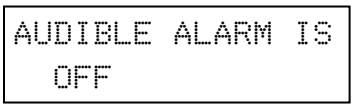


LOOP – Adjusts the loop factor of the 4–20 mA current loop. Factory default is 0.016 mA per ppm, which provides an output range of 0 ppm (4 mA) to 1,000 ppm (20 mA). Use the **Keypad** to set the desired loop factor, and then press **ENTER** to save that value and return to the previous screen.



To facilitate loop zero and span checking, note that when the **LOOP** function is selected the loop output is set to 20 mA, and upon exiting this function the loop output is set to 4 mA.

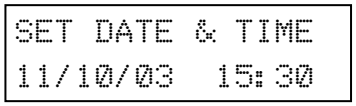
AUDALRM – Allows the monitor's internal audible alarm to be associated with any function of the monitoring system. Factory default is OFF. Use the **Keypad** to select the desired audible alarm function, and then press **ENTER** to save that value and return to the previous screen.



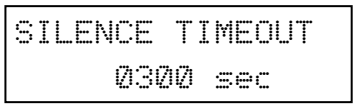
Audible Alarm Settings: OFF, ANY ALARM, SYSTEM FAULT, LEAK ALARM, SPILL ALARM, EVAC ALARM, MONITOR STOPPED

NOTE: *MONITOR STOPPED indicates there is a critical system fault, and the monitor is no longer functioning correctly.*

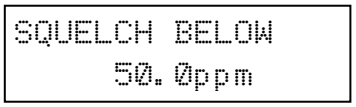
CLOCK – Sets the monitor's date and time. Use the **Keypad** to enter the correct date and time, and then press **ENTER** to save those values and return to the previous screen. Note that time is displayed in a 24 hour format, while the date is displayed as mm/dd/yy.



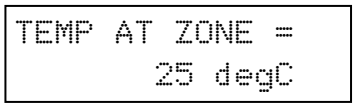
SILENCE – Used to enter a length of time for which the internal audible alarm and the external alarm are turned OFF when the front panel **SILENCE** button is pressed. The factory default is 300 seconds (5 minutes). If the cause of the alarm/fault has not been cleared at the end of this time period, the internal audible alarm and the external alarm device are reactivated. Use the **Keypad** to enter the desired time period, and then press **ENTER** to save that value and return to the previous screen.



SQUELCH – Sets a value of between 0.0 and 99.9 ppm that prevents the display of measurements below that value. Factory default is 0 ppm. For example, if the squelch setting is set to 50 ppm, then the monitor will not display measurements that are below that value. Use the **Keypad** to enter the desired value, and then press **ENTER** to save that value and return to the previous screen.

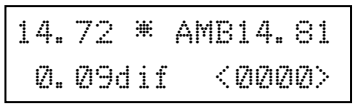


ZONETEMP – Used to enter the temperature of the area being monitored in °C, thus giving a more accurate ppm reading. The factory default is 25°C. Use the **Keypad** to enter the desired temperature, and then press **ENTER** to save that value and return to the previous screen.

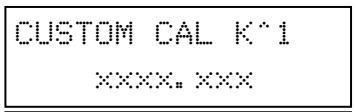


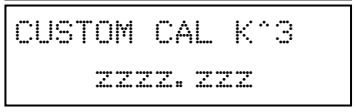
CAL – Used to change a calibration factor for a specific gas. This function is to be used ONLY with instructions from a Bacharach Service Center. Factory default is 1.000.

P-CHK – This **Pressure Check** function displays the current manifold pressure and the stored ambient pressure in psia, along with the difference between these two pressures and the current fault code. Refer to *Working with the P-CHK Function* (Page 22).



CUST K1, K2 & K3 – Used to enter custom calibration data for a blend of refrigerant gases that is not part of the monitor's standard 24 refrigerant gas library. Before using this function, the operator must contact the factory and provide information about the blend of refrigerant gases to be monitored. Custom calibration data will then be supplied to enable the HGMSZ to accurately monitor that particular gas blend. To enter this data, refer to Section *Entering Custom Refrigerant Calibration Values* (Page 20).





Working with Gas Alarms

Overview

If the refrigerant level in the area being monitored exceeds its preset Leak, Spill, or Evacuate Alarm level (Page 16), the HGMSZ will detect this alarm condition and turn ON the front panel **ALARM** (red) light. Additionally, an external alarm device may activate and the monitor's internal audible alarm may sound if those features have been enabled (Pages 10 & 17).

Clearing / Silencing a Gas Alarm

Once the gas-alarm circuit has been triggered all alarm indicators remain turned ON, even after the detected gas level returns to normal. Press the **SILENCE** button to clear all gas-alarm indicators after the cause of the alarm has been cleared and the detected gas level has dropped below all alarm levels.

Pressing the **SILENCE** button while a gas-alarm condition still exists causes the internal audible alarm and all external alarm devices that are connected to the alarm relays to turn OFF for a period of time as set by the **SILENCE** function (Page 17). The front panel **ALARM** light remains ON, however, as an indication that an alarm condition still exists, but will automatically turn OFF once the gas level returns to normal. The alarm circuit will reactivate at the end of the silence period if the detected gas level is still above an alarm level.

Viewing the Gas Alarm Log

From the **Data Display** screen, use the **Keypad** buttons to place the arrow (>) on the display next to the **ALARMS** function. Then press **ENTER** to display the alarm log.

The alarm log shows the type of alarm (LEAK, SPILL, or EVAC), plus the date and time it occurred. If CLEAR is displayed, this indicates that an alarm was acknowledged at the date and time shown.

Immediately after selecting the **ALARMS** function, the most recent alarm event is displayed. In the example below, record #03 shows that a Spill Alarm occurred on 11/10/03 at 15:06. Note that if more than 30 alarm events have occurred, then the newest event overwrites the oldest.

```
#03     SPILL @
11/10/03  15:06
```

Note that the Alarm Log can be cleared as described in Section *Clearing the Stored PPM Log, Alarms & Faults Data* (Page 20).

Working with System Faults

Overview

If a system malfunction occurs (see Fault Code list on Page 19), the HGMSZ will detect the problem and turn ON the front panel **SYSTEM FAULT** (yellow) light. Additionally, an external alarm device may activate and the monitor's internal audible alarm may sound if those features have been enabled (Pages 10 & 17).

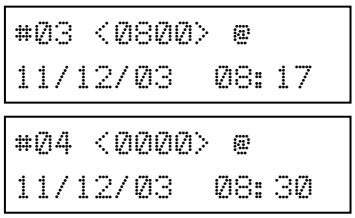
Clearing / Silencing a Fault Alarm

The **SYSTEM FAULT** light and all other fault indicators will automatically turn OFF after the cause of the fault has been eliminated.

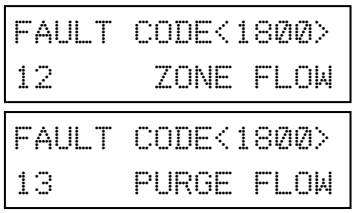
Pressing the **SILENCE** button while a fault condition still exists causes the internal audible alarm and the external alarm device that is connected to the fault relay to turn OFF for a period of time as set by the **SILENCE** function (Page 17). The front panel **SYSTEM FAULT** light remains ON, however, as a reminder that a fault condition still exists. The alarm circuit will reactivate at the end of the silence period if the cause of the fault condition has not been corrected. The **SYSTEM FAULT** light will automatically turn OFF once the fault has been cleared.

Viewing the Fault Log

From the **Data Display** screen, use the **Keypad** buttons to place the arrow (>) on the display next to the **FAULTS** function. Then press **ENTER** to display the fault log.



The fault log shows the monitor's current fault status. If the fault is still present when the **FAULTS** function is selected, then the current cause of the fault is displayed along with the date and time it occurred. If the cause of the fault has been cleared, then the fault log will show <0000> along with the date and time the fault was cleared. Use the **keypad** buttons to scroll through the fault log. In the examples shown to the left, record #03 shows that a Zone Flow Fault (fault code <0800>) occurred on 11/12/03 at 08:17, while record #04 shows that the fault was cleared on 11/12/03 at 8:30.



The cause of the fault is identified by a numeric fault code. To convert the fault code into a text description of the fault, first press the **ENTER** button and then use the **Keypad** buttons to scroll through the display until the text description of the fault appears. If the fault code is a combination of two or more faults, then continue to use the **Keypad** buttons until all fault text descriptions have been displayed. For example, the fault code <1800> represents the combination of both a Zone Flow <0800> and a Purge Flow <1000> fault as shown to the left.

Note that the Fault Log can be cleared as described in Section *Clearing the Stored PPM Log, Alarms & Faults Data* (Page 20).

Fault Codes

FAULT CODES ARE ADDITIVE. For example: A fault code of <1800> indicates that both a Purge Flow Fault <1000> and a Zone Flow Fault <0800> have occurred

<0001> Box Temperature Fault: Enclosure temperature is outside normal range (or IR detector has failed). Check that the monitor is not being subjected to extreme temperatures. Verify that the ventilation holes are not obstructed. Use the **DIAGNOS** function (Page 21) to check the Box Temperature.

<0002> Bench Temperature Fault: Optical bench is outside normal operating range (or IR detector has failed). Check that the monitor is not being subjected to extreme temperatures.

<0004> Manifold Pressure Fault: The manifold pressure is outside normal operating range (or IR detector has failed). Enter the **DIAGNOS** function (Page 21) and record ALL data. Call the factory with this information for further instructions.

<0010> Loop Fault: The 4–20 mA current loop is open, or there is a high resistance in the circuit. Check the wiring to the load/monitoring circuit. If this feature is not being used, a 100 ohm resistor must be connected to the 4–20 mA connector (Page 11).

<0100> Zero Filter Fault: A purge filter failure has occurred. Replace the unit's charcoal filter.

<0200> Gain Set Fault: The digipot autotune sequence has failed. This fault will only occur on first boot up or after a firmware upgrade. Call the factory for further instructions.

<0400> A/D Fault: A fault has occurred in the analog-to-digital circuitry. Contact the factory with this information for further instructions.

<0800> Zone Flow Fault: Check for: A kink in the gas-sample line or exhaust line; a blocked external termination filter; a blocked internal hydrophobic filter (Page 8); a failed pump.

<1000> Purge Flow Fault: Check that the inlet of the internal Charcoal Filter (Page 8) is not blocked. Once the blockage has been cleared, the monitor will return to normal operation after the monitor completes a purge cycle.

<4000> Zero Fault: The IR detector's output voltage is out of tolerance. Enter the **DIAGNOS** function (Page 21) and record ALL data. Call the factory with this information for further instructions.

<8000> Clipping Fault: The detector voltage may be out of tolerance. Use the **DIAGNOS** function (Page 21) to check the IR detector voltage. Call the factory with this information for further instructions.

Clearing the Stored PPM Log, Alarms & Faults Data

Up to 200 gas measurements, and 30 alarm and fault events are stored by the monitor.

To clear stored data, first display the data to be cleared by using the **PPM Log**, **Alarms** or **Faults** function (Pages 15). Next, press the **Right Arrow Keypad** and **ENTER** buttons at the same time. A single, long tone should be heard when the data has been successfully cleared.

Entering Custom Refrigerant Calibration Values

In addition to the 30 refrigerant gases available for selection, a custom gas can be added by using the **CUST K1, K2 & K3** functions (Page 17). Before using these functions, the user must contact the factory and provide information about the gas to be monitored. The factory will then supply values for K1, K2, and K3, which are the coefficients of a polynomial equation that represent the calibration curve of the custom gas.

From the **Data Display** screen, use the **Keypad** buttons to place the arrow (>) on the display next to the **CUST K1** function, and then press **ENTER** to display the **CUSTOM CAL K^1** screen. Use the **Keypad** buttons to enter the 1st coefficient value (K1) as received from the factory. Press **ENTER** to save this value in memory.

Repeat the above procedure to enter the values for K2 and K3.

Select the **CUSTOM** gas for monitoring by using the **GASTYPE** function (Page 16).

Reset to Factory Default Settings

IMPORTANT! *Performing this function will delete all program parameters, alarms, faults, and ppm log files.*

With AC power removed from the monitor, press and hold down the Factory Default Switch (Page 8). Apply AC power and listen for a beep and then a long tone. Release switch. At this time the monitor will purge the IR bench and auto set the IR detector voltage to its baseline 0 ppm value.

After warming up, reprogram the HGMSZ to the desired settings as needed.

Factory Default Settings

Parameter	Factory Default
Gas Type	R-134a
Leak Alarm	100 ppm
Spill Alarm	300 ppm
Evacuate Alarm	500 ppm
Log Interval	10 minutes
4–20 mA Factor	0.016 mA/ppm
Silence Timeout	300 seconds (5 minutes)
Squelch	00.0 ppm
Zone Temperature	25°C
Calibration Factor	1.000

Working with the DIAGNOS Function

Overview

The **DIAGNOS** function displays sensor data and status information useful to a service technician for troubleshooting various fault conditions. Explanations of the data shown in these screens are given below.

Keypad Functions

From the **Data Display** screen, use the **Keypad** buttons to place the arrow (>) on the display next to the **DIAGNOS** function. Then press **ENTER** to display the first of two **Diagnostic** screens.

Press the **Up Arrow Keypad** button to toggle between the **First** and **Second Diagnostic** screen.

First Diagnostic Screen

4.26500v <0000>	Bench Voltage		Fault Code
24.5cD* 14.72psi	Detector Temperature °C	*	Manifold Pressure
0.00250n <0000>	Noise		Fault Code
29.5cB* 14.72psi	Box Temperature °C	*	Manifold Pressure

In the **First Diagnostic** screen, the user can toggle between displaying the Bench Voltage / Noise and Detector Temperature / Box Temperature by pressing the **Right Arrow Keypad** button.

Bench Voltage – This is the current peak-to-peak output of the IR detector. In the absence of refrigerant this value can range from 3.90000V to 4.50000V.

Noise – The Noise value is a 16 point running average of the noise portion of the IR detector's output. This reading is valuable mainly when refrigerant is NOT present.

Detector Temperature – This is the current detector temperature in °C.

Box Temperature – This is the current internal enclosure temperature in °C.

Fault Code – Current fault code. A value of <0000> indicates that no faults are being detected.

Manifold Pressure – Current manifold pressure in psia.

Purge Valve Asterisk (*) – The purge valve can be opened and closed by pressing the **Left Arrow Keypad** button. An asterisk appears on the display when the purge valve is *open*.

Second Diagnostic Screen

0.4ppm 0.00	PPM Level		µMole/Liter
0.00002au*4.260v	Avg. Absorption Unit	*	Detector Voltage

PPM Level – Parts Per Million Level is the current detected gas level, and is the volume concentration referenced to standard temperature and pressure.

Average Absorption Unit – This is the optical absorbency. In the absence of refrigerant the absorbency is 0.00000 au. When sampling refrigerants, its value varies proportionally with the refrigerant concentration.

µMoles/Liter – This is the absolute concentration in micro-moles per liter of refrigerant.

Detector Voltage – This is a running average of the IR detector's bench voltage as displayed in the **First Diagnostic** screen.

Purge Valve Asterisk (*) – The purge valve can be opened and closed by pressing the **Left Arrow Keypad** button. An asterisk appears on the display when the purge valve is *open*.

Working with the P-CHK Function

Overview

The **P-CHK** function (Pressure Check Function) (Page 17) is useful to a service technician for troubleshooting a flow fault problem. The monitor will trigger a flow fault if the pressure drop from ambient is less than 0.2 psi during a purge cycle, and 0.5 psi during a measurement cycle.

Keypad Functions

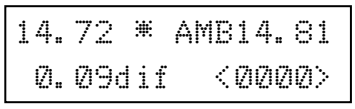
From the **Data Display** screen, use the **Keypad** buttons to place the arrow (>) on the display next to the **P-CHK** function. Then press **ENTER** to display the **Pressure** screen.

The **Left Arrow Keypad** button toggles the purge valve open and closed. Note that an asterisk (∗) appears when the purge valve is *open* (purging).

The **Down Arrow Keypad** button toggles the pump ON and OFF.

Pressing the **ENTER** button stores the current manifold pressure shown on the left to the ambient pressure shown on the right (must be done with the pump OFF).

Screen Display



Current Manifold Pressure	∗	Stored Ambient Pressure
Pressure Difference		Fault Code

Current Manifold Pressure – Current manifold pressure in psia.

Stored Ambient Pressure – Stored ambient pressure in psia.

Pressure Difference – The difference between the current manifold pressure and the stored ambient pressure.

Fault Code – Current fault code (Page 19).

Purge Valve Asterisk (∗) – When viewing the **Pressure** screen, the purge valve can be opened and closed by pressing the **Left Arrow Keypad** button. An asterisk appears on the display when the purge valve is *open*.

Working with the Calibration Function

Overview

If greater than standard accuracy is desired on any particular gas, the factory's default calibration factor of 1.000 may be adjusted by performing the calibration procedure as described below, and then selecting the monitor's **CAL** function to enter the new calibration factor.

IMPORTANT! *Changing the calibration factor will VOID the factory calibration. Typically, the monitor will remain within the factory-calibrated accuracy indefinitely and no calibration is required. Complex software algorithms adjust for temperature drift, IR source aging, and pressure changes in order to keep the unit within factory accuracy specifications.*

Calibration Procedure

The calibration factor is determined by sampling a known dilution of the refrigerant to be adjusted. The sample must be prepared to less than half the desired accuracy and the concentration must be corrected for ambient temperature and pressure at the time of measurement.

Calibration is best performed at or near full scale (1,000 ppm), it can however, be done at any concentration and ideally in the range where maximum accuracy is desired down to, but not below, 100 ppm.

A cylinder of a certified calibration gas must be used to ensure sampling occurs at ambient conditions. A minimum sample size of 5 liters is required.

The HGMSZ should be operating for at least one hour prior to performing a calibration.

Prepare the HGMSZ for sampling by using the **CAL** function to set the calibration factor for the refrigerant being measured to 1.000. Also, use the **LOG INT** function to set the log interval to 1 minute.

With the HGMSZ operating normally, connect the gas-sample bag directly to the gas-inlet port and allow the monitor to sample the entire bag. When sampling is complete view the logged ppm values using the **PPM LOG** function. If the bag was large enough for multiple samples, average the most stable ones. The new calibration factor is computed by dividing the known gas concentration value by the measured value. Typically this number will be between 0.95 and 1.05. Use the **CAL** function as described below to enter the new calculated calibration factor

Adjusting Calibration Factor

From the **Data Display** screen, use the **Keypad** buttons to place the arrow (>) on the display next to the **CAL** function. Then press **ENTER** to display the **Calibration** screen.

With the **Calibration** screen displayed, use the **Keypad** buttons to enter the new calibration factor.

Press **ENTER** to save this value.

Notes:

Maintenance

Warnings and Cautions

WARNING: *Always disconnect AC power before working inside the monitor.*

CAUTION: *When working inside the monitor, be very careful not to dislodge any electrical wiring or pneumatic tubing. The HGMSZ contains sensitive electronic components that can be easily damaged. Be careful not to touch or disturb any of these components.*

Charcoal Filter

The Charcoal Filter (Page 8) removes refrigerant gas from the purge-air stream during the purging process. Replace the charcoal filter (P/N 3015-4306) about every 6 months, when a zero filter fault occurs (fault code <0100>), or after the monitor itself has been exposed to unusually high levels of refrigerant gas, such as after an evacuation alarm.

Hydrophobic Filter

The Hydrophobic Filter (Page 8) prevents water from entering the IR detector. A zone flow fault will occur (fault code <0800>) if this filter should become blocked. Replace the hydrophobic filter as required (P/N 07-1650).

Servicing Air Lines & Termination Filters

The gas sample line and optional exhaust line should be periodically checked for obvious signs of kinks, damage, and contamination. Replace the tubing as required (P/N 304-2743).

The gas-sample line and purge-line termination filters prevent dust and dirt from entering the monitor. Both of these filters should be periodically checked and replaced when there are obvious signs of contamination. A zone flow fault will occur (fault code <0800>) if the gas-sample line filter becomes blocked, while a purge flow fault will occur (fault code <1000>) if the purge-line filter becomes blocked. To service the filter, simply remove it from the line and replace it with a new one (P/N 3015-3420).

Fuses

The HGMSZ is protected from electrical damage by two, 1 A, 250 V, type "F" fuses (Page 8). Carefully remove the fuses from their fuse clips and visually inspect each fuse for damage. Replace the fuses as required (P/N 04-2620).

Clock Battery

The Clock Battery (Page 8) maintains the correct date and time when AC power is not applied to the monitor. Replace this battery about every 2 years (P/N 204-0020).

Sample Pump

The Sample Pump (Page 8) draws the gas sample into the monitor, through the IR detector, and discharges the sample out the monitor's exhaust port. When replacing the pump, remove its inlet and outlet tubing, disconnect the AC power wires from the pump itself, and remove pump from monitor. Install a new sample pump (P/N 3015-4239).

Replacement Parts & Optional Accessories

Replacement Parts

Item Description	Part Number
HGMSZ, complete assembly	3015-4200
Battery, Panasonic BR2032, 3 V	204-0020*
Filter, Charcoal, Zero Air	3015-4306
Filter, Hydrophobic	07-1650
Filter, Termination (gas-sample line)	3015-3420
Fuse, 1.0 A, 250 V, Type “F”	04-2620
Pump	3015-4239
Tubing, ¼" OD (specify length when ordering)	304-2743

* **WARNING:** To preserve agency approvals and maintain the safety integrity of the monitor, the battery must be replaced with the specified Bacharach replacement part.

Optional Accessories

Item Description	Part Number
120 VAC Surge Protector	3015-4121
230 VAC Surge Protector	3015-4122
4–20 mA Surge Protector	3015-4123
Audible Alarm, 120 VAC	3015-3070
Audible/Visual Alarm, 120 VAC	3015-3076
Visual Alarm, 120 VAC	3015-3069

Service Centers

Replacement parts and service can be obtained by contacting one of the following Bacharach Service Centers.

United States

Bacharach, Inc.
621 Hunt Valley Circle
New Kensington, PA 15068
Phone: 724-334-5051
Fax: 724-334-5723
Email: help@bacharach-inc.com

Canada

Bacharach of Canada, Inc.
250 Shields Court Unit #3
Markham, Ontario L3R 9W7 Canada
Phone: 905-470-8985
Fax: 905-470-8963
Email: bachcan@idirect.com

México

Bacharach de México
Playa Regatas No. 473 Tercer Piso
Col. Militar Marte
Delegación Iztacalco, 08830
México D.F. México
Phones: +52-555-634-7740
+52-555-634-7741
FAX: +52-555-634-7738
E-mail: bacharachservicio@bacharach.com.mx
Website: www.bacharach-mexico.com

Europe

Bacharach Instruments
Sovereign House, Queensway
Leamington Spa
Warwickshire CV31 3JR
United Kingdom
Phone: +44-1926-338111
Fax: +44-1926-338110
Email: sales@bacharach-europe.com

Specifications

Product Type..... Multiple refrigerant gas monitoring system for low level continuous monitoring of refrigerant gases

Gas Library..... R-11, R-12, R21, R-22, R-23, R-113, R-114, R-123, R-124, R-134a, R-227, R-236FA, R-401a, R-402a, R-402b, R-404a, R-407a, R-407c, R-408a, R-409a, R-410a, R-500, R-502, R-503, R-507, R-508b, H-1211, H-1301, H-2402, N-1230, CUSTOM

Coverage..... Single zone

Measuring Range..... All gases 0 to 1,000 ppm

Monitoring Distance..... Up to 50 ft (15.2 m) maximum gas-sample line length

Front Panel..... 3 Indicator lights:
MONITOR ON – Green light ON when the unit is operating normally, or flashing during warm-up
SYSTEM FAULT – Yellow light ON when there is a system fault
ALARM – Red light ON when the gas level is above an alarm setting

Alarms..... Four SPDT relays are provided (rated 3 A, 240 VAC):
three assigned to ppm level alarms – one assigned to system faults

Internal audible alarm programmable for any of the following conditions:
OFF, Any Alarm, System Fault, Leak Alarm, Spill Alarm, Evacuation Alarm, Monitor Stopped

Detector Type..... Infrared, Non-Dispersive

Sensitivity..... All gases 1 ppm

Accuracy..... All gases ±10 ppm from 0 to 100 ppm
All gases ±10% of reading from 100 to 1,000 ppm

Response Time/Flow Rate... Dependent on gas-sample line length; 0.25" OD x 0.17" ID tubing:

Gas-Sample Line Feet (Meters)	Response Time Seconds	Flow Rate ml/min
0 (0)	9	675
10 (3.0)	13	664
20 (6.1)	17	653
30 (9.1)	22	642
40 (12.2)	26	631
50 (15.2)	30	620

Temperature Drift..... ±0.8% (R-134a) of reading per °C

System Noise..... Less than 40dB(A) at 10 ft (3 m)

Conditioned Signal..... 4–20 mA current loop

Power Safety Mode..... Fully automatic system reset; all programmed parameters retained

Operating Temp..... 32 to 122°F (0 to 50°C)

Ambient Humidity..... 5% to 90% RH (non-condensing)

Altitude Limit..... 6,562 ft (2,000 m)

AC Power..... 100 – 240 VAC, 50/60 Hz

Power Consumption..... 15 Watts

Size/Weight..... 7.4"H x 15"W x 3.3"D / 5 lbs (188 x 381 x 84 mm / 2.27 kg)

Certification..... UL 61010A-1; CAN/CSA 22.2 No. 1010-1B:1997;
CE Mark (see inside front cover)

Warranty..... 2 Years from date of shipment

Appendix

Table of Recommended Alarm Settings

Refrigerant	Leak PPM	Spill PPM	Evacuate PPM
R11	100	300	500
R12	100	300	500
R22	100	300	500
R23	100	300	500
R113	100	300	500
R114	100	300	500
R123	25	35	35
R124	100	300	500
R134a	100	300	500
R401a	100	300	500
R402a	100	300	500
R402b	100	300	500
R404a	100	300	500
R407a	100	300	500
R407c	100	300	500
R409a	100	300	500
R410a	100	300	500
R500	100	300	500
R502	100	300	500
R503	100	300	500
R507	100	300	500
R508b	100	300	500
H1301	100	300	500

Allowable Exposure Level (AEL) ASHRAE 34-1992.

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